IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	T. Yamaguchi et al.	Attorney Docket No.:	NAII123496
Application No.:	10/506,720	Art Unit:	1795 / Confirmation No: 5176
Filed:	March 10, 2005	Examiner:	J.J. Rhee
Title:	ELECTROLYTE FILM AND SOLID POLYMER FUEL CELL USING THE SAME		

RESPONSE TO FINAL REJECTION

Seattle, Washington 98101

July 22, 2008

TO THE COMMISSIONER FOR PATENTS:

In response to the Office Action mailed April 24, 2008, please reconsider and withdraw the final rejection in view of the following remarks. Claims 1-10 are pending in the application and stand rejected. Reconsideration and allowance of Claims 1-10 in view of the following remarks is respectfully requested.

Rejection of Claims 1-10 Under 35 U.S.C. §103(a)

Claims 1-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over EP 1202365, issued to Yamaguchi et al. (hereinafter "the Yamaguchi reference") in view of U.S. Patent No. 5,910,357, issued to Hachisuka et al. (hereinafter "the Hachisuka reference"). Withdrawal of the rejection is respectfully requested for the following reasons.

Claim 1 relates to an electrolyte membrane having a porous substrate with the following characteristics:

(a) a porous substrate having pores that are filled with a first polymer having proton conductivity that imparts proton conductivity to the electrolyte membrane, and

(b) a porous substrate comprised of

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(i) a second polymer that is a crosslinked polyolefin, and

(ii) a third polymer having a carbon-carbon double bond.

Claims 2-10 depend from Claim 1.

Admitting that the Yamaguchi reference fails to disclose that the porous substrate comprises a crosslinked second polymer wherein the second polymers are crosslinked with one another and a third polymer has a carbon-carbon double bond, the Examiner states that the Hachisuka reference teaches a porous substrate comprising a crosslinked second polymer and a carbon-carbon double bond-containing third polymer. The Examiner concludes that it would have been obvious to a person skilled in the art to combine the teachings of the Yamaguchi and Hachisuka references to arrive at the claimed invention. Applicants respectfully disagree.

The Combination of Yamaguchi's Teaching With Hachisuka's Porous Membrane Defeats the Established Function of Hachisuka's Membrane.

According to *KSR International Co. v. Teleflex Inc.*, when considering obviousness of a combination of known elements, the operative question is "whether the improvement is more than the predictable use of prior art elements according to their established functions." *KSR International Co. v. Teleflex Inc. (KSR)* 82 U.S.P.Q.2d 1385, 1396 (2007). Applicants submit that filling the pores of the porous shape memory polymer membrane of the Hachisuka reference with the proton conductive polymer of the Yamaguchi reference defeats the established function of Hachisuka's membrane.

The Hachisuka reference teaches a porous separation membrane containing a porous shape memory polymer. The function of the membrane is to separate or/and purify. Permeability is essential for the membrane to function as a separation membrane. It is necessary for Hachisuka's membrane to have unfilled pores in order to maintain its permeability. Therefore, filling the pores of the separation membrane with a proton conductive polymer

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according to the Examiner's suggestion would destroy the function of Hachisuka's separation membrane and, therefore, is not a predictable use of the prior art element according to its established functions.

The Hachisuka Reference Teaches Away From the Claimed Invention.

As noted in the response mailed December 20, 2007, using two specific types of polymers as porous substrate in the claimed invention achieves several desirable features including no or reduced change in the surface area of the electrolyte membrane.

The Hachisuka reference discloses shape memory polymer that can reversibly change its shape in response to any factors such as temperature, pressure, humidity, solvents, pH, electricity, and redox reaction (Col. 4, lines 49-54). Hachisuka teaches that "a shape memory polymer is a polymer that can change its shape "A" into another shape "B" (plastic deformation), fixing its shape by cooling, for example, and recovering its original shape "A" by heating the polymer again." See Col. 2, lines 48-52. Therefore, the shape-changeable polymer described in the Hachisuka reference is contrary to the property of no or reduced change in the surface area of the electrolyte membrane of the claimed invention.

Responding to the response filed December 20, 2007, the Examiner asserts that the Hachisuka reference discloses the same second and third polymers as the claimed invention. Because the same materials have the same property, the Examiner concludes that the Hachisuka reference does not teach away from the claimed invention. Applicants would like to direct the Examiner's attention to M.P.E.P. 2141.02 I, titled "The Claimed Invention as a Whole Must Be Considered," which states that:

> In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious.

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Applicants submit that the Hachisuka reference as a whole teaches away from the claimed invention.

The Hachisuka reference discloses using porous shape memory polymers as separation membrane by taking advantage of shape memory polymers' ability to reversibly change shapes. The reference emphasizes that it is preferable that the pore size of the shape memory polymer membrane will reversibly change in response to at least one factor selected from the group consisting of temperature, pressure, humidity, solvents, pH, photoreaction, electricity, chelation and redox reaction (Col. 2, lines 57-61).

In contrast, the claimed invention repeatedly states that one of the advantages of the claimed electrolyte membrane is the property of no or reduced change in the surface area of the membrane (page 2, lines 9-11; and page 10, lines 18-20). Therefore, the problem raised by the present application and the solution provided by the claimed invention are opposite from Hachisuka's teaching. Applicants submit that, contrary to the Examiner's assertion, the Hachisuka reference as a whole teaches away from the claimed invention.

The Yamaguchi Reference Teaches Away From Using a Shape Memory Polymer of the Hachisuka Reference in Making the Porous Substrate of the Claimed Invention.

As noted in the response filed December 20, 2007, the Yamaguchi reference requires that the electrolyte membrane be made of a porous substrate that does not swell substantially with methanol and water. See Abstract. It is further noted that, throughout the reference, Yamaguchi stresses the importance of a porous substrate having swell-resistance against organic solvent and water and being endurable in a high-temperature environment. See, for example, Abstract; Col. 2, lines 1-4 and 22; Col. 3, lines 22-24; Col. 6, lines 56-57; Col. 9, lines 1-3, 20, and 40-41. Therefore, the shape-changeable polymer described in the Hachisuka reference is the exact type of polymer that the Yamaguchi reference teaches away from.

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Citing the teaching of the Hachisuka reference at Col. 5, lines 10-11, the Examiner states that the Hachisuka reference teaches shape memory polymer that can change from a glass state to a rubber state. The Examiner concludes that the Yamaguchi reference does not teach away from using shape memory polymer of the Hachisuka reference.

Applicants would like to direct the Examiner's attention to the cited language at Col. 5, lines 8-14, of the Hachisuka reference, which states that:

> Concerning solvents, the shape memory polymers are not limited as long as they memorize the shape by swelling, contracting or by the transition between the glass state and the rubber state. Preferably used are above-mentioned heat-crosslinked structure units such as crosslinked polyvinyl alcohol and crosslinked polyamide.

Therefore, even with the memory shape polymer that is capable of transition between a glass state and a rubber state, the Hachisuka reference emphasizes the polymer's ability to change the shape and equals this type of polymer with shape memory polymer memorizing the shape by swelling or contracting, i.e., the type of polymer that the Yamaguchi reference teaches away from. In view of the fact that the Hachisuka reference teaches the disclosed memory shape polymers as equivalent to each other, applicants submit that the Yamaguchi reference teaches away from combining Hachisuka's shape memory polymers.

There Is No Reason or Motivation to Combine the Teachings From the Yamaguchi Reference and the Hachisuka Reference.

The Yamaguchi reference teaches a porous substrate with pores filled with graft polymer having ion-exchange groups for proton conductivity, for use in an electrolyte membrane of a fuel cell.

The Hachisuka reference teaches a porous separation membrane containing a porous shape memory polymer for separation-purification purpose. The reference has disclosed nine different types of polymers to be used as the shape memory polymer in the separation membrane

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(Col. 10, lines 23-29) and the only shape memory membrane disclosed is a polyurethane-based shape memory polymer, which is not a polyolefin as recited in the claimed invention (Col. 7-9, Examples 1-8). There is absolutely no guidance in the reference on how one skilled in the art would pick out and combine two specific polymers, polyolefin and polymer, with carbon-carbon double bond, as in the claimed invention.

There is no reason, motivation, or suggestion in the cited references or the prior art for a person skilled in the fuel cell technology to take a separation membrane, specifically, Yamaguchi's porous shape memory polymer membrane, use the membrane as a porous substrate, and fill the pores of the substrate with a proton-conductive polymer according to Yamaguchi's teaching to arrive at the claimed invention. Therefore, applicants submit that in raising the obviousness rejection, the Examiner has carried out impermissible hindsight reconstruction by picking and choosing elements from different references using the claimed invention as a blueprint.

Because the cited references do not teach, suggest, provide any motivation or reason to make, or otherwise render obvious the claimed invention, the claimed invention is nonobvious and patentable over the cited references. Withdrawal of the rejection is respectfully requested.

Family Patent Applications

Applicants would like to inform the Examiner that the European Patent Office and the Japanese Patent Office have both recognized the novelty and nonobviousness of the claimed invention. The corresponding EP application has been allowed to patent as EP 1487041 on April 25, 2007, without any Office Action. The corresponding JP application has not received any novelty and/or obviousness rejections.

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CONCLUSION

In view of foregoing remarks, applicants believe that Claims 1-10 are in condition for allowance. If any issue remains that may be expeditiously addressed in a telephone interview, the Examiner is encouraged to telephone applicants' attorney at the number listed below.

Respectfully submitted,

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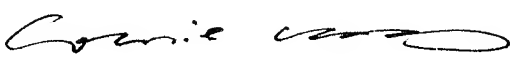

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